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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR MARCH 1936

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FRUIT INSECT INVESTIGATIONS

Raisin-drying methods, effect on moth infestation.--Thirty-eight samples of Thompson Seedless raisins, dried on wooden trays, were compared by H. C. Donohoe, of the dried-fruit insect laboratory at Fresno, Calif., with an equal number of samples of the same variety dried on paper trays rolled, after drying was partially completed, into a package called the biscuit roll. Infestation by the raisin moth (Ephestia figulilella Greg.) averaged 48,000 per ton in the former and 13,000 per ton in the latter. Drying of raisins on wooden trays is completed by piling the trays in stacks in which the fruit is shaded and accessible to insects, whereas the folding and rolling of the paper trays gives considerable protection from infestation.

Screening raisins to remove insect infestation.--By use of a portable shaker screen run by an electric motor which turned the offset crankshaft about 450 r. p. m., Mr. Donohoe succeeded in removing about 78 percent of the infestation by the raisin moth in samples of raisins of the Thompson Seedless variety. The work was done on ranches as the raisins were being removed from drying trays. About 43 tons, from 15 crops, were sampled before and after sifting. As an efficiency of 95 percent was obtained under the best conditions, improvements in the machine and in its operation are expected to result in better performance. The machine appears to be effective also in removing sand from the fruit.

Effectiveness of oils in control of San Jose scale.--O. I. Snapp and J. R. Thomson, of the peach-insect laboratory at Fort Valley, Ga., have just completed recording the results of experiments to determine the effectiveness of blended oils, as compared with straight-run oils, for the control of Aspidiotus perniciosus Comst. on peach trees. They report that tests with five different blended oils, each at a 3-percent strength, gave just as good control of the San Jose scale on peach trees as did the straight-run oils at 3-percent strength. In similar tests conducted at strengths of 2 percent, almost as good control of the San Jose scale resulted from the use of the blended as from the straight-run oils. From the results of these experiments, Messrs. Snapp and Thomson concluded that, when used at the recommended strength of 3 percent, a blended oil is just as effective as a straight-run oil for the control of the San Jose scale on peach trees in the South. Other experiments carried on to determine the relation of the volatility of lubricating oil to the control of the San Jose scale on peach trees showed that the volatility factor up to 5.4 percent has no effect on the control of that insect in the latitude of Fort Valley, provided, of course, that the viscosity was within the recommended range (125 seconds or higher, Saybolt). Oils having a volatility of from 8 to 13 percent were less effective in scale control.

Effect of cold winter on Japanese beetle larvae, preliminary report.--I. M. Hawley and T. N. Dobbins, Moorestown, N. J., have reported on the effect of winter on larval populations of the Japanese beetle. A survey indicated a high mortality in certain parts of the southern half of New Jersey. In Burlington County an average of 54 percent of the larvae were dead, and in Atlantic County 29 percent were dead. The mortality varied greatly in the different fields. In one field not a single living larva could be found. At two regular survey stations in the vicinity of Moorestown the mortalities were 73 and 80 percent. In 35 surveys in Ocean County 85 percent of the larvae were dead, but the beetle population is relatively low in these counties. In surveys made in southwestern New Jersey (Cumberland County), an area that has for several years had a high beetle population, mortality of about 25 percent is indicated in pastures and about 30 percent in cultivated fields. In the northern half of New Jersey at 3 sites in Middlesex County the mortalities were only 1, 6, and 9 percent. In the suburban sections north of Philadelphia in eastern Pennsylvania, an average mortality of only 6 percent is indicated. At one point south of Philadelphia, however, 81 percent of the larvae found in 50 surveys were dead. The mortality observed in southern New Jersey is much greater than usual. In a series of studies of the soil population carried on in the years 1930 to 1934, inclusive, it was found that there was an average reduction of only 2 percent among the overwintering larvae between November 15 and April 15. In January and February of 1936, however, there was a prolonged cold spell, during which soil temperatures were unusually low. The larvae usually pass the winter at depths of from 4 to 8 inches, but at times they are found deeper in the soil. Occasional dead larvae have been found during March at depths of 12 inches, and at even lower depths larvae of native scarabaeids (Phyllophaga and Cotinis) were also killed. A study of United States Weather Bureau data on the snow cover during the low-temperature period, which was continuous from January 23 throughout February, indicates that in a considerable part of southern New Jersey, below the latitude of Trenton, the snow cover ranged from 1 to 4 inches, whereas in the northern half of the State there was, as a rule, from 5 to 9 inches of snow on the ground. The insulating effect of a snow cover is well known, and apparently its presence or absence has been the main factor in determining the survival or kill of larvae. The types of precipitation in the northern and southern sections of New Jersey differed during this period. In the southern section on January 19 this took the form of sleet that fused to make a coating of ice, while farther north the covering consisted of snow. This difference probably influenced the soil temperatures and the mortality.

Ants as predators of Japanese beetle and its parasites.--R. T. White, Moorestown, has completed a study to determine the status of ants as predators of the Japanese beetle and its parasites. Representatives of 12 genera, including 23 species of the more common ants in the generally infested Japanese beetle area, were used in insectary experiments and field studies. Comparative data from field surveys in areas infested with ants and from corresponding areas where ants were not present, show very little difference in relative grub populations. Numerous insectary experiments to determine any relationship between ants and Japanese beetles indicate little, if any, intentional harm by the 23 species of ants used in the experiments to the egg or any of the subsequent stages of the beetle. Experiments using various formicid species and *Tiphia* cocoons in the soil show that only one species, *Solenopsis molesta* Say, consistently damaged the cocoons of this parasite. Cocoons riddled by *S. molesta* have been found in the field, as well as in the insectary plots. The study fails to show that ants have any appreciable deleterious effect upon the Japanese beetle or its parasites.

MEXICAN FRUIT FLY CONTROL

Fruit fly control in lower Rio Grande Valley.--The harvesting period for the 1935-36 citrus crop closed on March 31. Little fruit remained in the groves or packing houses at the close of the season, and all the marketable fruit was packed before the host-free period began. Thirty-eight adult *Anastrepha ludens* Loew were trapped in the valley, 1 in northern Hidalgo County, and 5 in Brooks County. The number of adults trapped in the valley decreased from 83 during February to 38 during March. This decrease was expected, as adults apparently leave the area when the fruit is harvested. Or feed on nectar as blooms of various kinds presumably appear in Mch. & later.

FRUIT FLY INVESTIGATIONS

Activity of female flies.--Oviposition studies in Mexico on *Anastrepha serpentina* Wied. by W. E. Stone, Mexico City, show that females may be active as long as 112 days before beginning to lay. Presence of females in the field without eggs during the winter season may therefore be expected.

DATE SCALE CONTROL

Progress in scale control.--Scouting was continued in the Coachella Valley and 117 unlisted palms were found. Most of these were newly planted offshoots, the others small volunteer palms. A final check-up of fan palms was begun in the infested area. Pruning of bushy palms, difficult to inspect, was begun in the Imperial Valley. This is preliminary to the final inspection. Leaf bases were removed from 24 previously infested palms to eliminate the possibility of infestations beneath the fiber.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Seasonal hatching and growth of grasshoppers in California.--C. C. Wilson, of the Sacramento, Calif., laboratory, reports as follows: "Eggs of *Melanoplus mexicanus* Sauss. were first noted hatching on February 8 and they continued to hatch until March 11 in Imperial County, with the maximum hatch occurring on March 6. These facts were obtained by cooperation with B. A. Harrigan, agricultural commissioner of Imperial County. On March 12 Thomas Chalmers, agricultural commissioner of San Luis Obispo County, noted the first hatching of *Cammula pellucida* Scudd. and *Oedaleonotus enigma* Scudd. in his county. On March 27 the nymphs on the egg beds of an area in this county selected for intensive study ranged in numbers from 1 to 500 per square foot and in size from first to third instars. Eighty-five percent of the eggs were hatched on the south slopes of the ranges in contrast to none on the north slopes. Eye spots were not visible in the eggs on the north slopes. In the Antelope Valley of Los Angeles County *M. mexicanus* eggs were unhatched in alfalfa fields near the end of March but those of *O. enigma* were hatched and the individuals ranged in size from first to third instars in the grazing lands on the west side of the valley."

Winter mortality of European corn borer.--A. M. Vance, of the Toledo, Ohio, laboratory, reports that no evidence of a pronounced lethal effect on corn borer larvae from the low temperatures of the past winter has appeared in any localities where observations have been made to date--in Toledo, Ohio, Lenawee County, Mich., New Haven and Hartford Counties,Conn., and Monmouth and Ocean Counties, N. J. On the contrary, a lower mortality rate is indicated than that found in March 1934. D. W. Jones found no winter mortality on the Eastern Shore of Virginia up to March 9. Since that date mortalities as high as 4 percent have been noted in some of the more heavily infested fields.

Winter mortality of hessian fly in Kansas and Missouri.--E. T. Jones, of the Manhattan, Kans., laboratory, reports that in southeastern Kansas and southwestern Missouri several fields observed last fall to be severely injured by hessian fly appeared to have recovered from injury by March 14. Dissections of flaxseed collected on that date from 3 localities and in Manhattan on March 24 indicate comparatively high winter mortality and show population to be well advanced. The results of these dissections are shown in the following table.

Locality	Condition of fly	
	Dead	Pupated
	Percent	Percent
Missouri:		
Carthage	16	28
Springfield	20	62
Kansas:		
Parsons	12	30
Manhattan	16	24

Control of sugarcane borer by flooding.--J. W. Ingram and H. A. Jaynes report from Florida as follows: "For the past several years officials of the Fellsmere Sugar Company have practiced flooding their stubble annually as a borer control measure during the period from January to March, or immediately following the harvesting of the cane crop. The stubble was flooded for at least 72 hours. Prior to the adoption of this practice by the president of this company, losses from borers were heavy, but following this practice there has been a marked reduction in borer injury. This period of flooding has apparently not affected the stand of cane coming from the flooded stubble. Examinations to determine the effectiveness of flooding from the standpoint of larval mortality were made on January 27 and 28. The fields had been flooded for 85 hours beginning on January 10. Prior to flooding, the trash had been burned. Check fields had been neither flooded nor burned. Eighty-nine percent of the borer stages in the trash were dead in the area that had been burned and flooded, as compared to 19 percent in the untreated trash. It appears that flooding stubble to control borers is a very profitable practice at Fellsmere, especially as little cost is involved because of gravity flooding and drainage."

Parasites of the sugarcane borer.--Messrs. Ingram and Jaynes also state that in searching for a supply of borers for use in parasite-introduction work, Pennock Plantation, having 18 acres of cane, at Jupiter, Fla., about 19 miles north of West Palm Beach, was visited. In examining sugarcane there, 13 empty and 8 unemerged puparia of a parasitic fly were found in borer tunnels. Parasitization was estimated to be from 30 to 40 percent. This material was determined by C. T. Greene and D. G. Hall, Washington, D. C., as Theresia claripalpis v. d. W. The cane was cut in small lots at intervals for use as cattle feed, resulting in a continuous supply of young and old cane for borers and their parasites.

Eggs of stored cereal insects resistant to fumigants.--According to R. T. Cotton, Geo. B. Wagner, and H. D. Young, Manhattan, Kans., laboratory tests indicate that eggs of the flour beetle and flour moth are highly resistant to the fumes of chloropicrin. A 1-hour exposure to a saturated atmosphere failed to give a perfect kill. A dosage of 4.14 pounds per 1,000 cubic feet of space was required to kill eggs of the flour moth in 24 hours, and a dosage of 6.2 pounds per 1,000 gave only 63-percent kill of flour moth eggs. These results indicate that flour-mill and atmospheric-vault fumigations with chloropicrin cannot be as satisfactory as has been supposed. Carbon disulphide does not kill eggs of the flour moth and flour beetle in low concentrations for short exposures, a dosage of 23.4 pounds per 1,000 cubic feet of space for a 3-hour period being required. The saturated atmosphere of ethylene dichloride failed to kill eggs of these species in 1 hour, although for a 24-hour exposure a dosage of 2.34 pounds and a dosage of 3.12 pounds per 1,000 cubic feet of space, respectively, gave 100-percent kill of the eggs of the flour moth and the flour beetle.

Temperatures experienced by hibernating chinch bugs in Kansas.--W. T. Emery, Manhattan, reports that the temperatures to which hibernating chinch bugs were subjected last winter were determined by means of thermocouples imbedded in clumps of Andropogon sod, one being located well down in the crown of a clump of A. furcatus and another on top of the crown of a clump of A. scoparius. Temperatures were recorded daily about 8 a. m. and 2 p. m. Each clump of sod was protected by a good tuft of grass and during January and February 1 or 2 inches of snow afforded additional protection. Daily air temperatures were recorded by a thermograph. Temperatures in the lower part of the crown level never reached the thermal death point, whereas temperatures in the upper crown level dropped to or below the thermal death point 19 times and once reached the lowest thermal death range. The air temperatures went below the upper thermal death range 35 times and 27 times below the lower thermal death range. According to counts of living chinch bugs that survived the winter, the mortality ranged between 40 and 50 percent.

JAPANESE BEETLE CONTROL

Autogiro purchased for Dutch elm disease scouting.--Delivery was accepted on March 14 of a two-seated PA-18, 1933 autogiro, which will be used in preliminary observations for wilting characteristic of Dutch elm disease attack. In this way speedy coverage may be made of territory that cannot be immediately reached by field scouts. Last summer members of the permanent staff made several observation trips both in an autogiro and in an airplane. Aerial observations were found to have considerable possibilities in determining concentrations of the disease and in spotting dead and dying elms that might harbor the disease or furnish breeding places for insect carriers. Autogiro scouting of the various railroad routes over which imported burl elm logs traveled en route to veneer factories in the Middle West is planned.. Spot photographs of suspected areas may be made. Inquiries are being made concerning existing aerial photographic maps of the Dutch elm disease area with a view to procuring them for use of the ground scouts and in observations from the air. The original price of the autogiro was $6,750 and although it had been flown only 67 hours, it was obtained for the approximate price of three 1½-ton trucks.

Clear-cutting completed in one swamp area.--Clear-cutting work in area 1 of the Great Piece Meadow, Essex County, N. J., was completed during the week of March 7. Eradications in this area totaled 54,269 elms, from which 601 confirmed trees were determined. Great Piece Meadow comprises areas 1, 2, and 4 in Essex County and area 8 in Morris County.

Dutch elm disease personnel.--Personnel engaged in Dutch elm disease activities at the end of March numbered 3,157 W. P. A. workers, 58 appointees, 5 per diem men on regular funds, 805 C. C. C. enrollees, 21 men from transit camps, and 44 State men, a total of 4,090.

Infested cordwood intercepted.--On March 17 road inspectors stationed at South Glastonbury, Conn., on the border of the generally infested gypsy moth area, intercepted a truck load of cordwood en route from a private estate at Wolfeboro, N. H., to a residence in New York City. Examination of the wood disclosed one new gypsy moth egg mass and four old egg clusters. Neither the owner of the wood nor his driver had any knowledge of the quarantine regulations. It being learned that cordwood was transported to New York City from the Wolfeboro section in 1935, details of the interception were referred to the New York State Department of Conservation so that surveys might be made in the vicinity of the New York residence to determine whether infestation had been spread on the wood.

Flood waters may spread gypsy moth infestation.--With the flood waters of the Connecticut River carrying seaward large quantities of trees, branches, logs, posts, lumber, pulpwood, and debris, the speculation is raised as to the possibility of gypsy moth infested forest products being scattered over large areas of farmlands in the lightly infested section of Middlesex County, Conn., or of being carried south along the Atlantic coast.

Provisions for treating beetle infestations in St. Louis, Mo., and Greenville, S. C.--Advices have been received from J. Carl Dawson, Plant Officer of the Missouri Department of Agriculture, that approval has been received of a State W. P. A. project for combined lead arsenate treating and intensive trapping of the Japanese beetle infested section of St. Louis. Estimated expenditures total $70,570, with contributions of $42,482 from W. P. A. funds and $28,088 by the Missouri Department of Agriculture. Relief funds will be used for the purchase of one-half of the 60 tons of lead to be used, for labor, and for the hiring of motor trucks. State contributions provide for spray tanks and their operation, certain other equipment, an additional 30 tons of lead arsenate, and supervision of the treating. In South Carolina $1,600 of State funds are available for treating approximately 16 acres in the infested section of Greenville.

Private life of ants, crickets, and spiders demonstrated in novelty specialty.--An inquiry from an individual in Hanover, N. H., revealed an interesting, new business in ant, cricket, and spider houses, the manufacture of which has been patented. The manufacturer reports a growing demand for these novelties, with many orders coming from hospitals, schools, and similar institutions. Since each shipment involves a quantity of soil, arrangements have been made for Japanese beetle quarantine certification.

Floods interfere with establishment of road posts.--A Japanese beetle road-patrol supervisor driving a light delivery truck and a driver with a 1½-ton truck experienced considerable difficulty while engaged in setting up road inspection stations preparatory to the assignment of inspectors to the posts. The muddy condition of several Virginia highways made it impossible to transport the booths on the automobile chassis dolly usually employed, so it was necessary to unbolt and dismantle the booths and load them aboard the truck to move to their new sites in the vicinity of Culpeper. A booth had been equipped and replaced near the Harpers Ferry, W. Va., bridge a few days before the Potomac River swept over the bridge and destroyed many structures in its path. Later the two men were marooned in a city in western Pennsylvania and found it necessary to drive 400 miles to reach Harrisburg, 200 miles distant.

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Survey growers in newly regulated area.--Survey work progressed rapidly among growers and dealers in sections that were added to the Japanese beetle regulated area with the revision effective March 16. In Tompkins County, N. Y., most of the newly added establishments are small and do a local business. The survey has been completed in the few election districts added in Maryland. This work has also been finished in the Richmond, Va., district and most of the firms contacted requested that their establishments be classified. Increased inspections and bad roads in the rural sections surrounding Washington, D. C., prevented completion of the survey there. It is expected that about 50 classified establishments will be added in the tier of counties taken under regulation in northeastern Virginia.

Warm spell speeds nursery shipments.--With the arrival of typical spring weather late in March, nurserymen were forced to speed their operations to the limit. Higher temperatures forced open the buds so rapidly that nurserymen were apprehensive as to whether they would be able to complete the orders on hand for spring delivery. Most of the nurseries added extra help, as the customers demanded immediate shipment of their stock. Inspectors were obliged to closely schedule their calls in order to meet inspection demands. Two temporary employees were added to the inspection force at one of the principal nurseries in the Philadelphia area.

New locations for road-patrol stations.--Enlargement of the northern Virginia Japanese beetle regulated area added one highway to the number of important exits that must be guarded. The new Virginia road stations will be located on U. S. Route 50; 2½ miles west of Paris, at the Shenandoah River; on U. S. Route 211, ½ mile east of Amissville; and on U. S. Highway 15, between Culpeper and Madison Mills. Frost heaving of the macadam has left routes 15 and 50 in bad condition. During the effective period of the summer quarantine on fruits and vegetables, an additional post will be operated on Virginia Route 7, between Purcellville and Berryville on the west side of the Blue Ridge Mountains.

FOREST INSECT INVESTIGATIONS

Weevils a problem in acorns for Shelterbelt plantings.--N. D. Wygant, of the Fort Collins, Colo., laboratory, reports that insects affecting forest-tree seeds are becoming problems where seeds are needed in such large quantities as for the Shelterbelt project. Bur oak and post oak acorns were collected during the fall of 1935 in Kansas, Oklahoma, and Nebraska in large quantities for planting in shelterbelt strips and nurseries. Seventy-five percent of the acorns contained weevil larvae when collected. In some localities the acorns were so badly weeviled that they were not worth collecting.

Flatheaded borer damages honeylocust in Shelterbelt.--J. A. Beal, Fort Collins, reports that honeylocust (Gleditsia tricanthos L.), a tree widely used in early windbreak plantings and in the new plantings because of its supposed immunity to insect injury, has, during the past summer, been heavily attacked and killed in many plantings by a flatheaded borer, Agrilus difficilis Gory. Many of these trees in the older shelterbelts have been making good growth during the past 15 to 20 years, but it appears that the effects of the prolonged drought have so weakened them that they have fallen easy prey to the borers. This belief is borne out by the fact that heavy irrigation of some of the infested trees at Woodward, Okla., at the time when attack was first observed, reinvigorated many of them sufficiently to repel the insect attack.

Tree-ring calendar.--The ancient climatic history of eastern Oregon is gradually being revealed through a study of ponderosa pine growth rings being made by F. P. Keen, of the Portland, Oreg., laboratory. The effects of catastrophies such as forest fires, floods, insect defoliations, and drought periods are all recorded in these tree rings. The study was started in 1923 in an effort to determine the relation of drought to western pine beetle epidemics and has been given increased attention this year. With the help of two W. P. A. computers, radial sections from the stumps of 213 freshly cut ponderosa pines on four widely separated areas have been measured ring by ring to the nearest 100th millimeter. All measurements have been adjusted for age, diameter, and normal rate of the trees. This alone involved over 50,000 percentage computations. The pattern of growth fluctuations has been found to be uniform over all southeastern Oregon and northeastern California and has been traced back for 600 years. The results of the study, the first comprehensive one of its kind in the Pacific Northwest, should be available within the next few months and undoubtedly will be of much interest, not only to forest entomologists, but to foresters, agriculturists, meteorologists, and all concerned with the periodicity of floods and drought.

Megastigmus pinus Parf. destructive to Shasta fir seeds.--R. L. Furniss, Portland, reports that a collection of 13,000 seeds of Shasta fir (Abies magnifica var. shastensis) was made in September 1935, near Lake of the Woods, Oreg., by members of the Pacific Northwest Forest Experiment Station. These seeds were kept in a tin container until March 1936, when it was found that they were so badly riddled by insects that the lot had to be discarded. Examination of a 2-percent sample of the seeds on March 18 showed 56 percent sterile, 41 percent ruined by insects, and 3 percent sound. Practically all of the insect-infested seeds were attacked by M. pinus. Two percent of the seed chalcids were parasitized.

Effects of defoliation of ponderosa pine.--J. C. Evenden, of the Coeur d'Alene, Idaho, laboratory, reports on the results of a study made in connection with an epidemic of the pine butterfly (Neophasia menapia Felder) which occurred in the vicinity of Payette Lakes, Idaho, in 1921. During this outbreak, which continued through 1923, when it was brought under complete control by natural factors, large areas of ponderosa pine were severely defoliated. A sample plot was established near New Meadows in 1924 for the purpose of obtaining data relative to the actual after effects of such defoliation. Annual examinations were made of the trees within this plot from 1924 to 1930, and in 1933 and 1935. Data obtained in these examinatins show that 12 percent of the trees died as a direct result of defoliation and that 14 percent were attacked and killed by western pine beetles. It is also believed that some of the trees killed by beetles were so severely weakened by the injury that they would have died from the effects of defoliation alone. In addition to the actual destruction of trees there was a material reduction in the basal growth rate of those still living in 1935. During the period of this study, the increased basal diameter of the trees that survived the injury was about 60 percent of the growth during a comparable period prior to defoliation.

Relation of low temperature to mortality of overwintering broods of the mountain pine beetle.--Mr. Evenden also reports that in the fall of 1935 arrangements were made to obtain daily temperature records from two C. C. C. camps located adjacent to infestations of the mountain pine beetle in lodgepole pine. Following the low temperatures of last February, T. T. Terrell and A. L. Gibson obtained samples from four infested areas in Montana. Blocks of wood with approximately 1/2 square foot of bark surface were taken from the north and south sides of each tree at a 5-foot interval, and at 1 foot above the ground in areas where the snow was of such depth as to indicate a protection to this portion of the tree. In one area a few samples were obtained at a height of 17 feet. Samples were taken from 25 trees. It was found that a very high mortality had occurred. At the 5-foot interval this was approximately 98 percent for all trees. At 1-foot and 15-foot heights there were a few living insects. This mortality was associated with a low minimum temperature of -35° and a maximum temperature of -15° at one of the C. C. C. camps and a minimum of -15° and a maximum of -1° at the other. Detailed records from adjacent Weather Bureau stations have not yet been received. The trees from which these samples were taken will be reexamined in June to check the condition of the brood just prior to emergence. The association of this mortality with the February temperatures is not too positive a conclusion. In October 1935 a sudden freeze caused severe damage to plant life throughout the Northern Rocky Mountain region. Ponderosa pine foliage was killed, unpicked apples were ruined, and many cherry trees were destroyed. The possibility of this sudden and abnormal freeze playing an important role in the subsequent mortality of overwintering broods of bark beetles must be recognized.

Larval development of European spruce sawfly.--H. J. MacAloney, of the New Haven, Conn., laboratory, reports that a second generation of European spruce sawfly larvae, reared in the laboratory, spun their cocoons from 23 to 25 days after hatching. The period of larval development checks closely with that of the previous generation. The information obtained this winter will materially aid in the progress of life-history investigations to be undertaken this year.

Recent findings in New York.--J. V. Schaffner, Jr., and P. A. Perry, New Haven, report the finding of a light infestation of Cryptococcus fagi Barensp. at Roslyn, L. I., N. Y., and the second recovery of Tetrastichus turionum Htg. from Rhyacionia buoliana Schiff. at Matinecock, L. I.

Parasites of tent caterpillar in Minnesota.--P. B. Dowden, New Haven, reports that three species of egg parasites have issued from egg masses of the forest tent caterpillar (Malacosoma disstria Hbn.) received from the

Chippewa National Forest in February. They have been tentatively determined, subject to confirmation by the National Museum, as Telenomus clisiocampae Ashm., Tetrastichus malacosomae Gir., and Ooencyrtus clisiocampae Ashm., all of which occur in New England.

Larch sawfly parasites.--Mr. Dowden also reports issuance of four species of parasites (3 hymenopterons and 1 tachinid) from cocoons of Nematus ericksonii Htg. collected at the Flathead National Forest in Montana by J. C. Evenden and from several points in Wisconsin, Minnesota, and Michigan by L. W. Orr. Apparently all of these parasites are common to both regioms, but they have not yet been specifically determined.

Another Dutch elm disease carrier convicted.--W. D. Buchanan, of the Morristown, N. J., laboratory, reports that the Dutch elm disease fungus (Ceratostomella ulmi (Schwarz) Buisman), has been isolated for the first time from adults of an introduced ambrosia beetle, Xylosandrus germanus Bldfd., which issued from an elm log infected with the fungus. R. R. Whitten, of the same laboratory, reports that the fungus has been isolated from adults of a histerid beetle, Platysoma coarctatum Lec., removed from galleries of Scolytus multistriatus Marsh. in elm.

PLANT DISEASE CONTROL

Barberry eradication.--Expansion of field work in barberry eradication during the latter part of March and the first part of April has been somewhat retarded by weather conditions in the Middle West. On April 15, however, there were 2,600 men at work. Some expansion had been made in 15 of the 17 States that are conducting stem rust control activities with emergency funds. A recent report from L. K. Wright, in charge of eradication work in Pennsylvania, states: "It is estimated that in 1936 there will be an increase of 15 percent over the past 10-year average in the acreage of oats planted in northeastern Lackawanna and southeastern Susquehanna Counties in an area where 150 square miles have been cleared of barberry bushes. During the past 10 years numerous farmers in this area have completely abandoned growing oats because of repeated failures due to stem rust." L. M. Ames, who spent a portion of his time during the past winter in taxonomic studies of the Berberidaceae, makes the following comment: "The best key for the identification of barberries is contained in 'Cultivated Trees and Shrubs' by Rehder. About 75 species are described. The Arnold Arboretum contains more than 240 species of Berberis and about 75 species of Mahonia. In view of the large number of species in the herbarium which are not included in Rehder's manual, as well as the numerous species not represented in the herbarium, it appears desirable to prepare a more inclusive key which will include at least the species represented in the herbarium. Two hundred and fourteen species have now been keyed out and already there have been many occasions to use the added information in making determinations of specimens sent in for identification."

Blister rust control program in sugar pine region.--Field operations in California for 1936 will consist of 23 75-man eradication camps, distributed as follows: Plumas National Forest, 6 camps--all in Plumas County; Eldorado National Forest, 5 camps--all in Eldorado County; Stanislaus

National Forest, 6 camps--1 camp in Calaveras County, 3 in Tuolumne County, and 2 in Mariposa County; Sierra National Forest, 6 camps--4 in Mariposa County and 2 in Merced County. In Oregon field operations will consist of 7 66-man camps in the Rogue River National Forest, 4 of these camps being located in Josephine County and 3 in Klamath County. From contacts with the W. P. A. and National Reemployment Service offices in San Francisco, it appears that we shall have no difficulty in filling our labor requisitions. A large proportion of laborers will probably be obtained from W. P. A. transient camps, as was the case in 1935. We plan to begin field operations just as early in the spring as weather and growing conditions (*Ribes* leaf conditions) will permit, and it seems probable that the first camps can open in the latter part of April.

Results of pine- and control-area mapping in Northeastern States.--Since the close of the *Ribes*-eradication season in October 1935, pine- and control-area mapping, which is an essential part of blister rust control, has been the major field project in connection with blister rust control activities in the Northeastern States. This work has been conducted in all the States in this region, except New Jersey. During the 4-month period, November 1 to February 29, a total of 1,129,779 acres were mapped, and an additional 1,734,448 acres were examined and eliminated owing to lack of sufficient pine to justify the cost of *Ribes*-eradication work. A total of 3,781 miles of control-area boundary lines were marked in the field. This fall and winter work required 29,632 man-days of labor and gave much-needed employment to men obtained from relief rolls.

Blister rust nursery sanitation in Southern Appalachian States.--In the Southern Appalachian States, 9 white-pine growing nurseries and their environs were examined for *Ribes* during the month of March--5 in Maryland, 3 in Virginia, and 1 in West Virginia. The only nursery in this region where crew eradication will be necessary is located at Parsons, W. Va., where work will be started about April 15.

COTTON INSECT INVESTIGATIONS

Boll weevil survival for 1936.--R. C. Gaines and associates, Tallulah, La., and F. F. Bondy, Florence, S. C., report that the annual spring examinations of Spanish moss to determine the boll weevil survival were made at Tallulah and at Florence from March 2 to 20. Representative samples from woods near infested fields were taken at both places. No live boll weevils were found in the moss this spring. This is the first time since 1926 and the second time in the 21 years at Tallulah and 8 years at Florence in which examinations have been made that no live weevils were found in the spring moss examination. Samples of trash from under timber and brush, consisting of leafage debris, and all material on the surface of the ground were also examined for hibernating weevils at both localities. At Tallulah trash collected from the edge of infested fields and at varying distances up to more than 200 feet in the woods, contained live weevils at the rate of 141 per acre. None of the weevils were found in samples taken more than 100 feet from fields. All of the weevils were in samples of leafage, none being found in pine straw or grass and weeds. At Florence trash was examined from soil collected in woods within 150 feet of infested fields and found to contain live weevils at the rate of 181 per acre. Records of the number of weevils found at varying distances from fields at Florence are not available. Since the dead weevils disintegrate and are difficult to find, the number found probably represents only a small proportion of those present and is not an accurate indication of the mortality. From general observation it appears that where the timberline is more dense and where Spanish moss is present more weevils are found in the ground litter. The activity of weevils in hibernation cages was much less than usual this winter at Tallulah and Florence, but about normal at College Station, Tex. Fewer weevils were taken on the flight screens at Tallulah during the winter than ever before. Fewer weevils than normal entered hibernation last fall at Tallulah and Florence and indications are that the survival at these places will be the lowest on record. At College Station about an average survival is indicated.

Boll weevil field-plot control tests in Mississippi in 1935.--H. C. Young, State College, Miss., summarizes a report on boll weevil control tests conducted at State College and Hattiesburg, Miss., during 1935, as follows: (1) In 5 comparable tests, one presquare application of calcium arsenate dust, not followed by later treatments, gave an average gain of 25 pounds of seed cotton per acre and an average profit of $0.74; and regular calcium arsenate dusting gave an average gain of 48 pounds of seed cotton per acre and an average loss of $0.79. (2) In 5 tests, one presquare application of calcium arsenate dust followed by later applications of calcium arsenate after 10 percent infestation gave an average gain of 144 pounds of seed cotton per acre and an average profit of $2.47; and regular calcium arsenate dusting gave an average gain of 122 pounds per acre and an average profit of $2.21. (3). In 5 tests, one presquare application of calcium arsenate dust followed by two applications of calcium arsenate at weevil-migration time gave an average gain of 46 pounds of seed cotton per acre and an average profit of $0.52; and regular calcium arsenate dusting gave an average gain of 130 pounds per acre and an average profit of $2.44. (4) In 4 tests, two applications of calcium arsenate at migration gave an average gain of 38 pounds of seed cotton per acre and an average profit of $0.40; and regular calcium arsenate dusting gave an average gain of 81 pounds per acre and an average profit of $1.15. (5) In 2 tests, three applications of calcium arsenate after 10-percent infestation gave an average gain of 69 pounds of seed cotton per acre and an average profit of $1.63; and regular calcium arsenate dusting gave an average gain of 231 pounds per acre and an average profit of $7.08. (6) In 3 tests, dusting with 50-percent calcium arsenate and 50-percent lime mixture gave an average gain of 54 pounds of seed cotton per acre and an average profit of $0.88; and regular calcium arsenate dusting gave an average gain of 97 pounds per acre and an average profit of $1.97. (7) In the 14 tests at State College, regular calcium arsenate dusting gave an average gain of 109 pounds of seed cotton per acre and an average profit of $2.44. (8) In the 10 tests at Hattiesburg, regular calcium arsenate dusting gave an average gain of 98 pounds of seed cotton per acre and an average profit of $1.12. (9) In 24 tests, regular calcium arsenate dusting gave an average gain of 105 pounds of seed cotton per acre and an average profit of $1.89. (10) Only 1 method, one presquare application of calcium arsenate followed by later applications of calcium arsenate after 10 percent infestation, gave greater gain and larger profit than regular calcium arsenate dusting.

Presquare dusting for boll weevil in plots and fields.--During 1935 a series of tests was conducted by Mr. Young in Mississippi to determine whether presquare poisoning would give better weevil control when applied to an entire field than when applied to plots. The plots used ranged from 24 to 30 rows in width and from 300 to 500 feet in length. The area of the plots ranged from 0.54 acre to 1.09 acres, averaging 0.84 acre. The fields ranged in area from 4 to 9 acres, averaging 6.75 acres. The infestation in each field and plot was determined before treatment and at weekly intervals thereafter throughout the season. The infestation in the plots treated with one presquare application of calcium arsenate dust increased as rapidly as in the adjoining untreated plots. The infestation was considerably less in the treated fields after the poison application than in the surrounding untreated areas during every week throughout the season. Six weeks after treatment the infestation in the treated fields was delayed about 1 week in reaching a given point, as compared to the untreated fields, whereas there was no difference in the infestation of the treated and untreated plots.

Boll weevil parasites in South Atlantic States in 1935.--F. F. Bondy and C. F. Rainwater, Florence, S. C., reporting on boll weevil parasites and other insects reared from cotton squares during the summer of 1935, state that although 111,467 squares were caged, only 50,303 were actually productive of either boll weevils or boll weevil parasites. The number and species of parasites obtained were as follows:

Species	Virginia	North Carolina	South Carolina	Georgia	Florida	Total
Microbracon mellitor Say	74	671	648	626	13	2,032
Eurytoma tylodermatis Ashm.	--	35	72	196	--	303
Catolaccus hunteri Cwfd.	1	21	51	22	--	95
Zatropis incertus Ashm.	4	14	46	24	1	89
Triaspis curculionis Fitch	--	17	17	2	--	36
Eupelmus cyaniceps amicus Gir.	--	2	14	4	--	20
Myiophasia globosa Towns.	--	31	29	7	2	69
Triaspis curculionis var. rufus	10	18	2	--	--	30
Microbracon n. sp.	2	1	--	--	--	3
Tetrastichus hunteri Cwfd.	1	--	--	1	--	2
Microdontomerus anthonomi Cwfd.	--	--	--	2	--	2
Total	92	810	879	884	16	2,681
Percentage of parasitization in productive squares	4.2	6.4	5.1	5	2.7	5.32

All of the boll weevil parasites reared are hymenopterons, except the dipteron *M. globosa*. The percentage of boll weevil parasitization was found to vary considerably during the season in each of the States from which representative collections were made. Squares collected from some localities in each State were found to be consistently high in parasitization whereas squares from other localities were consistently low. Practically all of the squares collected were "fallen" squares, that is, squares that had been punctured by the boll weevil and had dropped from the plants. A large number of Hymenoptera and Diptera other than the known boll weevil parasites were also reared from the caged squares.

Notes on Heliothis obsoleta Fab. at Brownsville, Tex.--T. C. Barber and P. A. Glick report that the bollworm was found quite frequently in corn ears during January, although it was not observed on cotton during the winter months. On corn it was present in all stages, from minute to fully developed larvae. The corn was planted late in the fall for the winter crop, therefore the presence of the worms in the ears alone is sufficient to prove that the species is breeding under winter conditions. A number of larvae were collected in January and were placed in the insectary, some on corn and others on cotton bolls, to which they transferred readily. These larvae pupated during the middle of February and several emerged on March 16, 19, and 24. The first moths were also seen in fields of young corn on March 16, and numbers were taken at night around lights. A large emergence was evident at this time, as hundreds of moths could be found on the young corn plants and at lights. Alfalfa, beans, and other plants were examined, but no eggs or larvae were found. As it was not advisable to pull the corn apart to examine the blades for eggs, counts were made of larval infestation of *H. obsoleta*. A total of 25,200 seedling corn plants were examined between March 19 and 23 and 379 larvae and 47 moths of *H. obsoleta* were collected. Larvae were found on 1.12 percent and moths on 0.14 percent of the seedling plants.

Insects on cotton during the winter at Brownsville.--Beginning in January, Messrs. Barber and Glick made systematic sweepings of cotton plants at Brownsville with a hand net. During January they collected an average of 25.93 insects per 100 strokes; during February, 31.75 insects per 100 strokes; and during March, 67 insects per 100 strokes. Altogether, 3,094 insects were taken in 6,800 net strokes during this period. The most numerous species was the boll weevil, of which 612 were collected, or 9 weevils per 100 strokes. During February, 14 weevils were taken per 100 strokes, but they decreased rapidly during March and less than 5 per 100 strokes were collected. During January and February the immature stages of the boll weevil were also much more abundant than during March, probably due to the reduced number of bolls and squares during the latter month. Although January 1936 was the coldest January in the past 6 years and February the second coldest recorded in 54 years at Brownsville, and although insects were therefore probably less active and less abundant than during normal winters, the boll weevil apparently continued breeding as long as squares or bolls were available for oviposition. As the weevils in the Brownsville area are active during the entire winter and apparently become even more active in the spring, probably most of them die before the new crop develops enough to afford oviposition places. The cotton aphid (*Aphis gossypii* Glov.) was found on cotton during all of the winter months and some parasitization was noted. The cotton leaf perforator (Bucculatrix thurberiella Busck) was observed throughout the winter. Adults were collected in January, and larvae and pupae were found on the cotton plants each month. Two larvae, collected in January, pupated during the first week of February and the adults emerged on February 28 and 29. A larva that pupated on February 13 emerged on March 5 and another collected on February 5 pupated on February 15 and the adult emerged on March 7. Among the 3,094 insects collected and recorded were representatives of 12 orders, several dozen families, and several hundred species. The cotton leaf worm (Alabama argillacea Hbn.) was not collected, although old, empty pupal cases showed that this species had been present in the fall. The flea hopper (Psallus seriatus Reut.) was not collected on cotton and was not observed until March 23, when adults were collected on horse mint (Monarda critidora).

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Trap-plot cotton in the Big Bend.--There was considerable activity in the Big Bend area of Texas in March in preparation for trap plots of cotton this coming season. The farmers have prepared the land and the plots were planted during the latter half of March. These plots constitute one of the special control measures used in this area for the past several years to reduce the pink bollworm infestation and also the danger of its spread to other areas. Since the plots were planted the weather has been unusually cold and, as some of the cotton was just coming up, some damage is possible. A total of 10 plots has been planted, 2 in the Castolon section of Brewster County and 8 in the Presidio section of Presidio County. The other two measures of the special control program are field clean-up in the fall and delayed planting of the cotton crop the following spring, so that the majority of moths will emerge before cotton is fruiting. A few farmers were anxious to begin planting, but the recent cool weather caused them to change their minds. Indications are that the delayed planting date of April 15 is going to be satisfactorily observed, as has been the case since the program has been in effect. The farmers will cultivate and take care of the trap plots until cotton begins fruiting, at which time inspectors of this project will collect the blooms daily and destroy them after the necessary inspections have been made.

Wild cotton eradication.--The eradication of wild cotton in southern Florida made much better progress in March than in February. This was due to more favorable weather conditions. A first clean-up was made on 36-3/4 acres, from which 994 mature and 2,362 seedling plants were removed. A recleaning was made on 12,632½ acres, from which 1,386 mature, 1,353,255 seedling, and 12,253 sprout plants were removed. Bolls are inspected from time to time during the clean-up, but no specimens of the pink bollworm have been found this season. This wild cotton was first found to be infested in the summer of 1932, and its eradication is being carried on to reduce the menace to the main Cotton Belt. In addition to the above acreage, a survey was made on 36,127 acres without finding any plants. The cotton occurs along the low-lying coastal section and adjacent islands of southern Florida, so that considerable acreage has to be gone over to be sure that no plants have been overlooked. The work this season is being carried on with W. P. A. funds and, as larger crews are being used, it has been possible to cover a much larger area than during previous seasons. Almost 1,200,000 of the seedling plants removed during the month were found on Boca Grande Key. This key was cleaned last year but rather late in the season, after the cotton had opened. The large number of seedling plants found this year indicates that a considerable number of seed had fallen to the ground. No mature plants were found and only 5 sprout plants.

Thurberia plant eradication.--The eradication of Thurberia plants in the mountains of southern Arizona, using W. P. A. funds, has continued to make satisfactory progress. Work is now being carried on in the Santa Catalinas, the second nearest range to cultivated cotton. The nearest range is the Tortillitas, which was completed in February. During March, 5,500 acres were covered, on which 40,310 plants were removed. Many of the plants are infested with the Thurberia weevil, and it is to remove this menace from cultivated cotton that the work is being carried on. The Santa Catalinas are considerably rougher than the Tortillitas, and plants have been found at elevations up to 5,600 feet. In some cases it is necessary to use ropes to lower men to plants on shelves. Just recently men were lowered from a 5,000-foot cliff to a shelf at 4,700 feet, where 71 plants were destroyed, and on another day 130 plants were destroyed at a 5,300-foot elevation. Notwithstanding the rough country, only a few minor accidents have occurred, as every precaution is taken to safeguard the laborers.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Cryolite as effective as derris in control of Mexican bean beetle on lima beans.--In summarizing the results of the 1935 field-control experiments against Epilachna varivestis Muls., conducted at Mappsville, Va., L. W. Brannon, of the Norfolk, Va., laboratory, says: "In an experiment conducted on half-acre plots of Fordhook lima beans (using power machinery), in which cryolite spray (3-50), powdered derris root spray (0.025 percent rotenone), cryolite-talc dust (60-40), and derris-talc dust (0.22 percent rotenone) were compared, the results after six treatments showed that cryolite spray (3-50) was equally as effective as powdered derris root spray (0.025 percent rotenone), and that cryolite-talc dust (60-40) gave a considerably larger yield increase than derris-talc dust having a rotenone content of 0.22 percent. In comparing the yield increases at the time of the various pickings of this long-growing crop, there was an indication that powdered derris root spray failed to afford the residual effect obtained following applications of the cryolite spray. This has not been observed on the relatively short-growing snap-bean crop. The net profit per acre due to treatment was considerably greater from the application of cryolite spray than from the remainder of the material used in the experiment. This was due partly to the higher yield increase obtained with the material, but mainly to the decrease in the cost of treatment, as compared with that of the other treatments." In evaluating cryolite as an insecticide for the Mexican bean beetle, due consideration must be given to the possibility of harmful residue remaining on the harvested product if this insecticide is applied to the plants after the pods have begun to form.

Derris dusts impregnated with a spreading and wetting agent show increased efficiency against pea aphid.--T. E. Bronson, of the Madison, Wis., laboratory, reports that recent greenhouse tests have indicated that the efficiency of derris dust mixtures against the pea aphid (Illinoia pisi Kalt.) may be increased greatly by impregnating the dust mixtures with a commercially prepared sulphated alcohol known as sodium oleyl sulphate, special. Tests in which plants infested by the pea aphid were treated with various dust mixtures and placed in a chamber where the relative humidity remained at approximately 100 percent for a period of 16 hours after treatment, gave much more effective control of the pea aphid than in comparable tests in which the dusted plants were left in an open greenhouse. Derris dust mixtures containing 0.4 percent rotenone in which talc was used as the diluent, plus sodium oleyl sulphate as a conditioner, were more effective against the pea aphid in the course of experiments performed in the greenhouse than were derris dust mixtures in which kaolin or gypsum were used as the diluent, plus sodium oleyl sulphate as the conditioner, when the plants were left in the open. In instances where the treated plants were placed in a moist chamber, where a relative humidity of approximately 100 percent prevailed, no significant differences could be detected between the performance of each of the three dust mixtures in which different diluents were utilized. Better results were obtained with derris dust mixtures which contained a conditioner than with the unconditioned dusts.

Narcissus bulbs grown in Washington prove less tolerant to vapor treatment than those grown on Long Island.--According to a report by Randall Latta, of the Sumner, Wash., laboratory, parallel series of vapor-heat treatments for 4 hours at 118° F. of Long Island, N. Y., and Washington-grown narcissus bulbs of the varieties King Alfred and Glory of Sassenheim were made during the summer of 1935 in connection with sterilization tests of the bulb nematode (Anguillulina dipsaci (Kuhn) Jerv. & V. Ben.). In the forcing tests of these bulbs, those grown and treated at Babylon, Long Island, N. Y., produced better flowers than bulbs of the same stocks treated at Sumner, Wash. The bulbs grown at Sumner produced very few flowers and also had a poor top growth of foliage. The differences in the tolerance of the bulbs from the two localities is believed to be attributable to the hotter and drier summer seasons that prevail on Long Island.

Hibernation quarters of tobacco flea beetle.--As a result of studies to determine the overwintering quarters of the tobacco flea beetle, W. A. Shands, of the Oxford, N. C., laboratory, reports that the population of this insect in woodlands adjacent to tobacco fields was much greater than that in woodlands 135 yards distant. Also, that approximately 90 percent of the flea beetles overwintering, in the two locations studied, were present under the leaves and other forest litter in the first 10-yard strip along the edge of the woodland. As tobacco seed beds are ordinarily prepared along the edge of woodland areas, the information contained in these studies can be used to advantage in lessening the danger of direct flea beetle infestation of the plant beds.

Tobacco hornworm and budworm most abundant and destructive pests of tobacco in Georgia flue-cured district.--According to a summary of a survey conducted by F. S. Chamberlin, of the Quincy, Fla., laboratory, from May 16 to July 2, 1935, in the Georgia flue-cured tobacco district, Phlegethontius sexta Johan and Heliothis virescens Fab. were the most abundant and destructive insects to leaves of the growing tobacco plant, at least during the time when the survey was being conducted. The data also reveal that leaf injury by the tobacco budworm was much more prominent than that by the tobacco hornworm. Of the insects causing damage of lesser importance, the mole cricket (Scapteriscus vicinus Scudd.) and several species of cutworms and wireworms were apparently the most prevalent.

Lima bean pod borer causes heavy losses in southern California.--Rodney Cecil, of the Ventura, Calif., laboratory, reports that a recent survey of warehouses of 19 localities in the counties of Ventura, Orange, and San Diego, in southern California, disclosed an estimated loss of approximately $317,432.00 to the 1935 lima bean crop as a result of the damage caused by the lima bean pod borer (Etiella zinckenella Treit.). This survey involved data on a total of 807,190 100-pound sacks of lima beans. The estimated total loss included the percentage of beans which were actually damaged by the insect, as well as the increased cost of machine-cleaning and hand-picking operations incident to the removal of the damaged beans from the harvested crop.

INSECTS AFFECTING MAN AND ANIMALS

Technique for artificial rearing of screw worm fly.--Roy Melvin and Raymond Bushland, of the Dallas, Tex., laboratory, have developed a nutritional medium on which the larvae of the primary screw worm fly (Cochliomyia americana Cushing and Patton) can be reared successfully. Heretofore it has been necessary to keep a number of infested animals on hand in order to maintain a supply of the maggots for experimental purposes. This new method of rearing the larvae will be useful in promoting experimental investigations on the development of control measures against this species of screw worm fly.

How maggot excretions produce their healing effect.--Research on the ways by which the two elements, allantoin and Extract B, found in the excretions of surgical maggots promote healing shows that the typical effects are (1) a cleansing of the discharging wound by the removal of pus and dead malodorous tissues; (2) a reduction in the number and sometimes total disappearance of the bacteria which cause the disease; (3) stimulation of development of healing granulation tissue with abundant blood supply. Tests on the effect of these two extracts on cultures of bacteria occurring in the wounds show that neither of them can kill the bacteria direct. The destruction of the bacteria which does take place must therefore be a secondary or indirect effect of the extracts, such as a deterring or repellent action upon the bacteria by the healing granulation tissue forming in the wound. This vigorous growing tissue with abundant blood supply is unfavorable for the development of the bacteria.

FOREIGN PLANT QUARANTINES

Entomological interceptions of interest.--Thirty-three living larvae of the Mexican fruit fly (*Anastrepha ludens* Loew) were intercepted at Houston, Tex., on November 19, 1935, in 27 grapefruit in ship's stores from Mexico. A living larva of the pink bollworm (*Pectinophora gossypiella* Saund.) was taken at San Pedro, Calif., on January 18 in a cottonseed in baggage from Hawaii. A specimen of *Eurytoma onobrychidis* Nikolskaya arrived at New York on January 16 in seed of *Onobrychis viciaefolia* in the mail from Germany. A. B. Gahan states that this eurytomid is said to be phytophagous. Three living adults of the weevil *Brachyrhinus porcatus* Hbst. were taken at Buffalo, N. Y., on January 27 in soil around freesia and violet plants in the mail from Germany. A living larva of the oecophorid *Endrosis lacteella* Schiff. arrived at Honolulu, Hawaii, on August 2, 1935, in a walnut in the mail from New Zealand. A living adult of the chrysomelid *Doryphora uniformis* Jac. was taken at Charleston, S. C., on October 21, 1935, with banana debris in cargo from Panama. H. S. Barber reports this as new to the National Museum collection. A living adult of the West Indian cane weevil (*Metamasius hemipterus* L.) was collected on July 7, 1935, on sugarcane in the field at Manati, P. R. A living larva of the chrysomelid *Psylliodes chrysocephala* L. was intercepted at Philadelphia on January 18 in a radish root in stores from Spain. Living specimens of the gladiolus thrips (*Taeniothrips simplex* Morison) arrived at San Francisco on October 24, 1935, on carnation leis in baggage and quarters from Hawaii. This is a new name for this thrips which was previously known as *Taeniothrips gladioli* M. & S. Living specimens of the scale insect *Parlatoria fluggiae brasiliensis* Costa Lima were taken at New Orleans on February 8, 1935, on oranges in stores from Brazil. A living specimen of the coreid *Hypselonotus concinnus* Dall. arrived at Brownsville, Tex., on January 21 on a gardenia in cargo from Mexico. An adult of *Bruchidius cisti* (Fab.) was taken at Washington, D. C., on December 18, 1935, with seed of *Onobrychis viciaefolia* in the mail from Italy. This bruchid was intercepted at New York in 1920 and 1923 with seed of *Cytisus laburnum* from France.

Pathological interceptions of interest.--*Anguillulina dipsaci* (Kuhn) Gerv. and V. Ben. was intercepted in potatoes from Spain for the first time on March 9 at Houston. A new variety of *Cephalobus butschlii* de Man was intercepted at Boston March 3 in taros from Barbados, B. W. I. A leaf spot of *Anisacanthus* sp. from Mexico intercepted in baggage at Roma, Tex., proved to be due to an unusual but immature ascomycete. Our first interception of *Colletotrichum phomoides* (Sacc.) Chester from South America was made on February 28 at New York in tomatoes from Brazil. *Diplodia cerei-triangularis* Speg. was intercepted for the first time on October 4, 1935, at San Francisco on *Pachycereus* sp. from Mexico. *Erysiphe cichoracearum* D. C. was intercepted on March 4 on *Hyssopus* sp. from India at the Washington Inspection House. *Exosporium palmivorum* Sacc. was intercepted for the first time on February 12 at New York on *Phoenix* sp. from Italy. *Gloeosporium maxillariae* Allesch. was intercepted at San Juan, P. R., on August 13, 1935, on *Lycaste* sp. from Nicaragua, though the only report in Stevenson's manual is from Berlin, Germany. *Helminthosporium allii* Campanile was intercepted on onion for the first time on March 17 at Philadelphia in stores from Italy. *Heterodera marioni* (Cornu) Goodey was intercepted on *Osmanthus aquifolium* from Japan on February 28 at San Francisco. Potatoes from Mexico intercepted on March 13 at Naco, Ariz., and on March 26 at Douglas showed unusually severe infestations of *H. marioni*. Our first interception of *Heterosporium allii* Ellis and Mart. from Holland was made on March 18 at Baltimore on leek. *Mycosphaerella citrullina* (Smith) Gross. was intercepted on March 16 at New Orleans on squashes from Cuba. *Phyllosticta minutella* Bub. and Dearn was intercepted for the first time on September 27, 1935, at San Francisco on maple leaves from Nova Scotia. *Sclerotium oryzae* Catt. was intercepted from Ecuador and Persia for the first time on February 11 and March 2, respectively, in rice straw at New York. *Septoria citri* Pass. was intercepted from Palestine for the first time on March 3 on oranges at Baltimore. *S. gladioli* Pass. was intercepted from Austria for the first time on March 7 at Chicago on gladiolus corms. Our first interception of *Septoria pastinacina* Sacc. was made on February 15 at New York on parsnips from Spain. *Tolyposporella brunkii* (Ell. & Gall.) Clint., a smut of the family Ustilaginaceae, was intercepted on August 8, 1935, at Hidalgo, Tex., on a grass the specialists cannot determine, from Mexico. A good collection of rye straw severely infected with *Urocystis occulta* (Wallr.) Rabh. was made at Baltimore on March 19 from bottle jackets from Denmark, our first interception of the disease from that country. *Uromyces cestri* Lev. was intercepted for the first time on February 28 at Miami on *Cestrum* sp. from Cuba.

DOMESTIC PLANT QUARANTINES

Autogiro used for locating citrus in Louisiana marshes.--The problem of surveying the citrus growth in the marsh areas of Louisiana was recently solved by the use of an autogiro. Moats on which citrus exists were located by the use of high-powered binoculars, and were mapped on air photo compilations supplied by the Coast and Geodetic Survey. This method of systematically flying over the areas made possible the discovery of heretofore unknown locations of citrus growth and proved an ideal way to survey the swamp areas. The abandoned and escaped citrus trees will be destroyed by W. P. A. labor on citrus canker eradication.

Citrus canker in Calcasieu Parish, La.--A single tree in a clump of several dozen *Citrus trifoliata* near Bell City, La., was found infected with canker on February 25. This area represents a new location in current work, no canker having been found in Calcasieu Parish for 6 years.

Large planting of Citrus trifoliata eradicated in Texas.--One of the properties having the largest number of trifoliates in the Houston, Tex., district was recently worked by relief laborers on citrus canker eradication. For 3 days all the W. P. A. laborers in the area were assigned to this property and with the use of a 1½-ton truck they pulled 390 large trees. The owner was at first opposed to the removal of the trees, having sacrificed a grapefruit grove on account of canker some time ago, but was finally brought to the realization of the public benefit to be gained and has since cooperated in the work. Inspections for citrus canker are being continued throughout the citrus-growing region of Texas and some recurrent infections are reported from properties where the canker has previously been found.

St. Louis ranks first in number of quarantine violations intercepted.--A summary of the shipments of nursery stock and plant products intercepted by transit inspectors in 20 cities in February shows that more apparent violations were caught at St. Louis than at any other station, 42 citrus fruit shipments from the Mexican fruit worm area having been noted without the Federal permits attached.

Willful violation intercepted.--A parcel-post package shipped from Washington, D. C., to a point in Washington State, containing 36 shrubs, a cupful of soil; a statement that "sender claims nothing fragile" and a note inside, "If you don't want Jap. beetle, wash all dirt off roots down sink", and making up a complicity of violations of plant quarantine and postal regulations, was intercepted at Spokane by transit inspector M. E. Connolly and promptly turned back to the sender. The report has been referred to the proper Bureau and postal authorities for investigation.

Escaped peach trees destroyed in blossoming period.--W. P. A. laborers destroying nonproductive peach trees for the control of the phony peach disease concentrated their efforts on escaped trees in the recent blossoming period, and in the latter half of March the crews removed over 3 million such trees from 7,120 properties in Alabama, Arkansas, Georgia, Illinois, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, and Texas. Excessive rains and high winds beating the blossoms from the trees very materially reduced the period for quickly locating the escapes by means of the flowers. In the 7½-month period ending March 28, during which W. P. A. work has been carried on in the above States, the number of peach trees destroyed, including abandoned orchards, escaped trees, and those infected with the phony peach disease, totals over 15 million. Arrangements were recently made for increasing the labor, nearly doubling the number of men now employed.

White pine blister rust control areas established in Maryland.--Areas for growing white pine in *Ribes*-free zones in parts of the counties of Allegany, Garrett, and Washington, Md., and in Fort Frederick State Park and the Loch Raven Reservation, owned by the City of Baltimore, were legally set aside under regulations established by the Maryland State Board of Agriculture, effective December 1, 1935.

Peach mosaic survey begins in six States.--Arrangements are being completed for a cooperative survey of peach-growing areas in Texas, Colorado, Kansas, Iowa, Nebraska, and New Mexico to determine the distribution of the peach mosaic disease, now known to exist in Colorado, Texas, California, and Utah. W. P. A. workers who were trained to identify the disease last year while eradicating nonproductive peach trees in Delta and Mesa Counties, Colo., will be employed again this season. The project will be resumed as soon as weather conditions permit.

CONTROL INVESTIGATIONS

Digestion in leaf-eating insects.--A study has been begun by P. A. Woke and F. H. Babers on the digestion in leaf-eating insects. They are working on the enzymes in the digestive tract of the southern armyworm, and are making a survey of the enzymes occurring and where they occur. This work will be followed by a study of the absorption of the products of this enzyme action by the insect or subsequent further splitting of the compounds.

Spraying equipment tested.--Tests of a high-power sprayer for the project for the control of gypsy and brown-tail moths were completed on March 10. The sprayer was operated for a period of 80 hours at pressures of 1,000 pounds, with frequent short intervals at 1,500 pounds per square inch. The sample sprayer passed the tests and 12 units have been ordered.

INSECTICIDE INVESTIGATIONS

Our idea of pyrethrins' structure may have to be altered.--The investigations, begun over a year ago by F. B. LaForge, H. L. Haller, F. Acree, and P. Schaffer were undertaken with the object of preparing the two pyrethrins in pure condition for comparative tests on insects. In the early stages of the work a new and more convenient method for the preliminary purification of the extractives of the flowers was developed and a process was discovered for the partial separation of the two pyrethrins from each other. Later it became necessary to repeat some work reported by Staudinger and Ruzicka, especially that on the semicarbazones of the pyrethrins and of pyrethrolone. The pure semicarbazone of pyrethrin II was prepared for the first time. Pyrethrolone semicarbazone was readily obtained from the semicarbazones of both pyrethrins. It agreed in its properties with the material described in the literature, but repeated analyses indicate that it possesses a formula with two hydrogen atoms less than in the heretofore accepted formula. Analyses of a number of derivatives also indicate that they contain two hydrogen atoms less than the reputed content. Pyrethrolone itself proved difficult to purify. While the hydrogen content seemed to agree with the formula $C_{11}H_{14}O_2$ instead of the accepted $C_{11}H_{16}O_2$, the carbon content was always 1.0-1.5 percent less than is required by the last-mentioned formula. These findings have an important bearing on the structure of the pyrethrins and are being further investigated. The isolation of the pure unaltered pyrethrin is a matter of considerable difficulty but one of the greatest importance from several standpoints.

Survey of commercial calcium arsenates begun.--The substitution of calcium arsenate for lead arsenate in spraying fruit would be of great importance because it would get rid of the menace of lead poisoning. However, calcium arsenate has always been erratic, in that it appears satisfactory at times, and at other times it proves very harmful to foliage. The Division has just started an investigation of the 19 brands now on the market, in order to bring to the attention of the entomologists of the Bureau the differences between them. So far, results are available only for soluble arsenic by a method proposed by the New York Agricultural Experiment Station. This method is represented as making possible a choice between safe and unsafe brands; in our hands it has given results running from 0.2 to 11.5 percent soluble As_2O_5. The improved materials being offered by four of the manufacturers are all less soluble than the corresponding regular brands.

Complete information on cube and related plants.--There has just become available, in the form of mimeographed publication E-367, an important compilation by R. C. Roark entitled, "Lonchocarpus Species (Barbasco, Cube, Haiari, Nekoe, and Timbo) Used as Insecticides." Although cube root had been shown by N. E. McIndoo and A. F. Sievers in 1924 to have value against certain species of insects, the fact that its botanical origin was in doubt and that nothing was known of its chemical composition retarded its development as an insecticide. In 1930 the identification of one of the most potent kinds of Peruvian cube as Lonchocarpus nicou (Aubl.) DC., by E. P. Killip and A. C. Smith, enabled the systematic collection and cultivation of the plant to be undertaken on a commercial scale. During the past 5 years growing interest has been shown in cube by entomologists, chemists, insecticide manufacturers, and exporters of South American products, and recently it has been brought into the United States in commercially significant quantities. It is the purpose of this compilation to bring together all the data relating to cube and to other plants of the genus Lonchocarpus known to have insecticidal action. It is hoped that this publication will be helpful to those interested in insect control and, more especially, that it will stimulate research to fill many gaps in our present knowledge.

BEE CULTURE

Clear medium devised for culturing Bacillus larvae White.--A clear medium has been devised by C. E. Burnside for culturing B. larvae. This bacterium, which causes American foulbrood of bees, does not grow readily on an ordinary culture medium but when unheated egg yolk is mixed with the agar fairly luxuriant growth is obtained. A distinct disadvantage of this egg-yolk medium is its turbidity. Numerous attempts have been made to devise a clear medium suitable for culturing this organism by adding other accessory food products. When egg yolk was omitted, however, B. larvae did not grow so luxuriantly as when it was added. In comparative tests at the National Agricultural Research Center, Bureau of Entomology and Plant Quarantine, Beltsville, Md., fully as luxuriant growth was obtained when a small amount of egg yolk was spread over the surface of the medium and 2 or 3 drops mixed with the inoculum as when the egg yolk was mixed with the agar. This method of adding egg yolk promises to give a practically clear medium for culturing B. larvae without diminishing the luxuriance of growth.

More desirable type of microsyringe developed.--A microsyringe for the artificial insemination of queen bees, the syringe being of the Watson type but more readily constructed because the screw passed through a wooden instead of a metal cap, was developed at the Somerset laboratory a few years ago. This syringe, like the original Watson model, contained a spring to force back the plunger. At times, when the spring was pushed down, the cement holding the cap to the glass tubing became loosened and was pushed off under the tension. A new type of syringe has been devised by W. J. Nolan, of the Beltsville laboratory, which eliminates the spring. The new syringe consists of an automatic pencil in which a plunger is substituted for the lead. The addition of a glass point for the plunger to work in completes the apparatus. Since the point is the only part made of glass, the new syringe is not nearly so fragile as the older types and is more readily repaired.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

New mosquito records for Cuba.--In a lot of 35 adult and larval specimens of mosquitoes sent in by Dr. Henry P. Carr, of the Comision de Malaria de Cuba, were two larvae and one female Anopheles atropos D. & K., a male and a female Culex bahamensis D. & K., and a new species of Culex of the subgenus Mochlostyrax, all identified by Alan Stone. The Anopheles has never been recorded from outside continental North America; and, although C. bahamensis probably occurs throughout the Greater Antilles, this is the first known record from Cuba. These were all collected in the vicinity of Havana.

Specimens of African fruit flies and parasites received for the National Collection.--Among a quantity of insect material recently brought from Sierra Leone, West Africa, by J. M. Gough, were large series of specimens of Ceratitis giffardi Bezzi and Ceratitis punctata Wied. The former was not previously represented in the National Museum collections, and of the latter these collections contained only two specimens. Included with the fruit flies were also nice series of the braconid parasites, Hedylus giffardii Silv., (Biosteres) Opius caudatus (Silv.), and Opius ? perproximus Silv., of which only the second was represented in the National Collection.

A European parasite of wheat-stem sawflies in the United States.--Two specimens of a parasite reared from Trachelus tabidus (Fab.) taken at Adamsville, Pa., and recently submitted for determination, have been identified by C. F. W. Muesebeck as Microbracon terebella (Wesm.). The material was reared by E. J. Udine, of the Carlisle, Pa., laboratory of the Division of Cereal and Forage Insects. These are the first specimens of this parasite to be recorded from the United States.

Specimens of Fornicia clathrata received.--Among material collected by E. J. Hambleton in Brazil in 1930, and recently submitted for incorporation in the National Museum collections, were four specimens of F. clathrata Brulle, determined by C. F. W. Muesebeck. Fornicia, of which clathrata is the type, is an anomalous genus of Braconidae, subfamily Microgasterinae, known from tropical America, Africa, Ceylon, and the Philippine Islands. So far as recorded, all species parasitize slug caterpillars, of the family Limacodidae. The genotype, which was not previously represented in the National Collection, has been reported only once before since its description in 1846. It is said to attack larvae of Sibine fusca Stoll.

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A new fossil mite.--A fossil mite in Cretaceous amber from Canada has been received for identification from the Museum of Comparative Zoology at Harvard University. It represents a new species of *Bdella* and is the second oldest fossil mite known. The oldest known fossil mite is from the Devonian of England. Both of these fossil species belong to the same suborder, the Prostigmata.

Another record of the bedbug from chicken houses.--D. C. Parman has transmitted, through the Division of Insects Affecting Man and Animals, specimens of the common bedbug (*Cimex lectularius* L.) from Uvalde, Tex., determined by H. G. Barber. Mr. Parman reports a heavy infestation of this bug in chicken houses at Uvalde last winter.

Chionaspis pinifoliae in Europe.--Specimens of a scale insect on white pine needles from Germany, intercepted at New York, have been identified by Harold Morrison as *Chionaspis pinifoliae* Fitch. This appears to be the first record of the occurrence of this insect in Europe.

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